CLAIMS

1. An electromagnetic tracking system, comprising:

a transmitter assembly having a transmitter coil trio;

a receiver assembly having a receiver coil trio;

a single coil mounted on one of said receiver assembly and said transmitter assembly, said single coil being positioned a fixed and known distance away from one of said receiver coil trio and said transmitter coil trio, wherein when said receiver assembly is moved relative to said transmitter assembly, relative motion between at least two of said transmitter coil trio, said receiver coil trio and said single coil is asymmetrical.

2. The electromagnetic tracking system of claim 1, wherein said transmitter coil trio is considered to be an origin, wherein said receiver assembly moves relative to said transmitter coil trio, and wherein movement of said receiver coil trio from an initial position to a position that is diametrically opposite from said initial position results in said single coil being located in a position that is a different distance away from one of said transmitter coil trio and said receiver coil trio, such that said relative motion between said transmitter coil trio, receiver coil trio and said single coil is asymmetrical.

3. The electromagnetic tracking system of claim 1, wherein said receiver coil trio is considered to be an origin, wherein said transmitter assembly moves relative to said receiver coil trio, and wherein movement of said transmitter coil trio from an initial position to a position that is diametrically opposite from said initial position results in

said single coil being located in a position that is a different distance away from one of said transmitter coil trio and said receiver coil trio, such that said relative motion between the transmitter coil trio, receiver coil trio and single coil is asymmetrical.

4. The electromagnetic tracking system of claim 1, wherein said single coil is mounted on said receiver assembly a fixed and known distance away from said receiver coil trio.

5. The electromagnetic tracking system of claim 1, wherein said single coil is mounted on said transmitter assembly a fixed and known distance away from said transmitter coil trio.

6. The electromagnetic tracking system of claim 1, wherein said receiver assembly is positioned on one of a medical instrument and a patient and said transmitter assembly is positioned on the other of said medical instrument and the patient.

7. The electromagnetic tracking system of claim 1, wherein said receiver assembly comprises a plurality of receiver coil trios, each of said receiver coil trios being positioned a fixed and known distance away from one another, and wherein a distance between any two receiver coil trios is different.

8. The electromagnetic tracking system of claim 1, wherein said transmitter assembly comprises a plurality of transmitter coil trios, each of said transmitter coil trios being positioned a fixed and known distance away from one another, and wherein a distance between any two transmitter coil trios is different.

9. The electromagnetic tracking system of claim 1, further comprising additional single coils mounted on at least one of said transmitter assembly and said receiver assembly, wherein each of said single coils is mounted a different fixed distance away from one of said receiver coil trio and said transmitter coil trio.

10. An electromagnetic tracking system that is configured to nullify hemisphere ambiguity, comprising:

a transmitter assembly having a transmitter coil trio configured to generate a magnetic field;

a receiver assembly having a receiver coil trio configured to sense the magnetic field;

a single receiving coil mounted on said receiver assembly and positioned a fixed and known distance away from said receiver coil trio, said single receiving coil configured to sense the magnetic field, wherein when said receiver assembly is moved relative to said transmitter assembly, while maintaining a constant orientation, to a position in which one of said receiver coil trio and said single receiving coil is located at a position that is diametrically opposite from an initial position of said one of said

receiver coil trio and said single receiving coil, the other of said receiver coil trio and said single receiving coil is located at a position that is not diametrically opposite from an initial position of said other of said receiver coil trio and said single receiving coil.

11. The electromagnetic tracking system of claim 10, wherein said receiver assembly is positioned on one of a medical instrument and a patient and said transmitter assembly is positioned on the other of said medical instrument and the patient.

12. The electromagnetic tracking system of claim 10, wherein said receiver assembly comprises a plurality of receiver coil trios, each of said receiver coil trios being positioned a fixed and known distance away from one another, and wherein a distance between any two receiver coil trios is different.

13. The electromagnetic tracking system of claim 10, wherein said transmitter assembly comprises a plurality of transmitter coil trios, each of said transmitter coil trios being positioned a fixed and known distance away from one another, and wherein a distance between any two transmitter coil trios is different.

14. The electromagnetic tracking system of claim 10, further comprising at least one additional single receiving coil mounted on said receiver assembly, wherein each of said single receiving coils is mounted a different fixed distance away from said receiver coil trio.

15. A method of alleviating hemisphere ambiguity in an electromagnetic tracking system, comprising:

disposing a transmitter coil trio configured to generate a magnetic field on a first body;

disposing a receiver coil trio configured to sense the magnetic field generated by the transmitter coil trio on a second body;

mounting a single receiver coil on the second body a fixed and known distance away from the receiver coil trio so that movement between the transmitter coil trio, the receiver coil trio and the single receiver coil is asymmetrical resulting in different magnetic field measurements by the receiver coil trio and the single receiver coil at every position during movement.

16. The method of claim 15, further comprising:

determining two positions (x, y, z) and (-x, -y, -z);

predicting a received field at the two positions using a field model of the single receiver coil; and

determining which predicted field better matches the magnetic field detected by the receiver coil trio and the single receiver coil.

17. The method of claim 15, further comprising maintaining a constant orientation of the receiver coil trio and the single receiver coil during movement.

18. The method of claim 15, wherein the first body is one of a medical instrument and a patient, and the second body is the other of the medical instrument and the patient.

19. The method of claim 15, wherein said disposing a transmitter coil trio comprises disposing a plurality of transmitter coil trios on the first body.

20. The method of claim 15, wherein said disposing a receiver coil trio comprises disposing a plurality of receiver coil trios on the second body.